California Public Utilities Commission
2002 Energy Efficiency Program Selection
R.01 – 08 - 028

Local Cross-cutting program seeking PGC funding in the PG&E Territory
Non-Utility Implementer (program duration extends to 12/31/03)

THE LIGHTING EXCHANGE:

On-line training and outreach for lighting professionals in Northern California

Submitted by:

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Certificate of Service: This is to certify that AfterImage + Space has served this proposal in hard copy and electronic formats to the service list in compliance with the service protocols for R01-08-028.

Program Overview

General:

This proposal seeks funding from the CPUC to fully execute an online lighting energy-efficiency information resource for Northern California called the Lighting Exchange. The Lighting Exchange consists of three areas that are fundamental to technology transfer and information dissemination that are geared toward helping Californians make energy-efficient lighting decisions:

Guidance: An interactive self-teaching area that provides basic through advanced levels of information about energy-efficient lighting equipment, lighting design, and lighting maintenance, and lighting economics.

Dialog: A hosted site that provides both push- and pull-mechanisms for discussion, allowing customers to ask questions and get answers from recognized authorities on the issues.

Tools: Diagnostic computer databases of equipment and algorithmic programs to help customers make energy efficient decisions for retrofits and new construction, based on the latest lighting technologies available.

This program was formerly funded by PG&E with PGC funds, but was never launched or fully executed due to political and administrative roadblocks within the corporate structure of the IOU. The team submitting this proposal consists of the original prime contractor (AfterImage + Space) and the program manager from the IOU (Marc Fountain, no longer employed by the IOU) that were responsible for the design of the program. It is our hope that the CPUC will allow this team to complete the task as originally envisioned.

In accordance with the OIR, we outline the fundamental proposal criteria as follows:

Type of Program:	Local, cross-cutting
Program Strategy:	Information Program using online user interfaces
Funding Requested:	2002: $1,291,823
	2003: $632,633
	Total[mf1] $1,924,456
Duration of Program:	Through December 31,2003
Source of Funding:	Electric Public Goods Charge (PGC)

The Lighting Exchange: On-line training and outreach for lighting professionals in Northern California has, as it's core, the following specific objectives:

- Complete the development, programming, and launch of the Dialog and Tools sections of the Lighting Exchange
- Complete a scoping study for the Guidance section of the Lighting Exchange
- Operate and support the Lighting Exchange through 12/31/2003

Background:

In 1997, the Northern California IOU (PG&E) with support from the CPUC began one of several attempts to revise the 1993 EPRI Advanced Lighting Guidelines (ALG). With the explosion of the internet offering new ways to disseminate information, an online interactive version of the ALG was considered. Staff and consultants for the IOU's Business Energy Management (BEM) unit conceived and proposed an internet-based non-residential energy efficiency information and outreach program for the IOU's service territory for lighting and other disciplines.

The program included three "exchanges", a Lighting Exchange, an HVAC exchange, and an Architectural Exchange. While the overall scope for all three were explored, only one, the Lighting Exchange, received funding from the CPUC to begin implementation in lieu of preparing a paper-based ALG revision. In 1998 and 1999, the Lighting Exchange was funded with nearly $1 million in PGC dollars for design, development and implementation.

In 1999, a substantial portion of the program was ready to be launched onto the Internet. However, continual delays fostered by administrative roadblocks led to the abandonment of the project by the IOU.

The story behind the abandonment has three main protagonists:

- Law: The lawyers at the IOU felt that the company was taking on too much risk by providing an online (therefore documented) question-and-answer hosted website.
- Marketing: The IOU marketing department would not allow the program to exist without having to go through complex "branding" issues for the sake of the IOU marketing goals, making it more costly and cumbersome to administer the site.
- Information Technologies: The IOU computer technologies team was hesitant to allow the program onto their system because it was generated outside the normal IOU channels (the program was developed by an outside consulting agency) and they did not therefore want to launch or be responsible for maintaining it.

In addition, the IOU failed to plan for proper funding for the staff required to launch and maintain the site. Ultimately, the project was abandoned. The url www.lightingexchange.com continues to be hosted by the IOU but there is no content posted.

After the abandonment of the Lighting Exchange project, the ALG were revised by New Buildings Institute (NBI) in 2001 under contract with the CEC. However, the ALG are on-line in a static format (pdf) only, and only comprises one-third of the scope of the Lighting Exchange.

The interactive functionality, outreach, and data management aspects of the Lighting Exchange are still lacking in our information rich world, while the access to reach this information (were it available) has increased dramatically. According to Boston University, Internet and email use has increased six-fold between 1997 to and 2000 worldwide, and the number is likely higher for the Northern California population. Many lighting manufacturers now catalog their products on the Internet, ranging from pictorial depictions to full specifications and detailed drawings. The use of the Internet as a research tool is now commonplace, yet nothing in existence on the Internet today offer the benefits of the Lighting Exchange.

Program Description:

The Lighting Exchange enhances the market in unique ways – by forming an online network of professional associates throughout the lighting community consisting of California energy customers, lighting manufacturers, energy service providers, contractors, and lighting design professionals. The Lighting Exchange will support other Northern California PGC programs where lighting decisions are made.

The three-prong structure of the system is based on the types of information lighting professionals and consumers need and how best that information is provided: Guidance is based on self-initiated and in-depth learning; Dialog is based on learning through direct question-and-answer; and the Tools are diagnostic programs that assist in making decisions when there are multiple variables to choose from. All three sections are connected together through links and pop-ups to assist the user in their quest for information.

A general outline describing some of the *unique* features of the three sections follows: *(Unique features are italicized)*

Guidance: The guidance section provides reliable and updated information for all areas of lighting, including general guidelines for products, such as lamps and ballasts, and design practice issues such as lighting design techniques and lighting quality.

The Guidance section stresses best-practice principles, and allows the customer to learn about lighting through a *combination of diagrams and direct links to higher-level information, including links to the Dialog area for direct questions and the Tools section for comparison analysis*. Thus, it is geared both to the residential customer (how does a compact fluorescent lamp save energy?) as well as the lighting professional (what ballasts are best to mitigate end-of-life fusing in compact fluorescent lamps?).

The sections of the Guidance area are multiple and arranged by technologies, design practice, and economics, and navigation between the areas is simplified by direct linkages between the areas. *This program provides a much-improved platform for learning than static, linear models* such as the existing ALG, as it *provides instantaneous information flow based on the consumer-selected path desired*. In addition, it *can be continually updated with new information without having to be issued on an every "x" year basis*.

Dialog: The heart of the Lighting Exchange will be the Dialog portion of the site, which *allows questions to be asked through a host who is a lighting expert. After the question is screened for relevance and uniqueness, an Exchange staff member digs for the answer on behalf of the questioner, even contacting members of a compensated panel of highly regarded experts in the field if necessary (at no cost to the local professional). Answers and comments are posted for public review.*

This is very different from the structure and function of free-for-all Internet news groups. The control advantage of the host is to eliminate spam, obscene, or irrelevant postings onto the Internet and keep the organization for lighting questions consistent. *In addition, the expert host will be able to answer most questions within 24 hours. All legitimate questions and responses will be posted on the Internet, with a search-by-topic format.*

Tools: *This interactive database and calculation arena provides direct comparisons of products, information on product compatibility, economic calculators, project design libraries, and links to manufacturer sites specific to the product search criteria established by the Lighting Exchange customer*. In addition, *once the products are chosen, economic analyses can be performed to determine the most cost-effective course of action for specific applications.*

The program includes five database or calculation Tools:

Ballast Database: *Includes published values for fluorescent and HID ballasts, with over 20 search criteria variables. The results from any search are sortable based on any of the variables, and statistical functions can provide overall comparisons and rankings*. The IOU is currently has an abbreviated and out-of-date version of a similar program on their Express Efficiency website, and a newly enhanced ballast database would benefit future incentive program for lighting.

Lamp Database: *Includes published values for most lamps used in residential and non-residential applications (excludes theatrical, automotive, and special-purpose lamps), sorted by lamp type, with search criteria specific to the lamp type. Lamps are also tied to the ballast database for compatibility checks.*

Retrofit Calculator: *Provides lighting retrofit design options based on common fixture installations (we estimate that the installations included in the database represent approximately 75% of commercial lighting installations). The customer inputs the fixture type, lamp type, and hours of operation, and the program produces a list of retrofit options with predicted energy savings. This program links to the above databases and the economics calculator.*

Economics Calculator: *Includes life-cycle cost-benefit analysis and simple payback computation programs that can import information from the above three databases. The program contains a complete analysis using energy rates, hours of operation, and allowances for lighting control comparisons. The system allows for three comparisons, and retains the project for recall in an Internet library.*

Manufacturer and Supplier Database: *Includes a list of product types and links to the manufacturers site, specific to the product being searched for.*

The distinct advantages that the Lighting Exchange provides over any existing information system available on the market are:

- *Information is objective and non-biased (as compared to manufacturer sites)*
- *Information flow leads customers to conclusions to act on the information given*
- *Information is always updated through direct feedback and communication with manufacturers and consumers on an equal footing*
- *Information is provided through direct access with experts in the field, without additional research required of the customer*

A typical user experience on one of the Exchanges would encompass the following activities: access best-practice guidance for a specific application, engage in a dialog with an expert to resolve a complex detail, develop and store online a project library with equipment that is verified for interoperability in a given application, easily perform a life-cycle cost analysis on the entire project library - including comparisons with existing conditions for retrofit analysis.

Defined Market Segments:

The Lighting Exchange is a cross-cutting program targeted to Northern California that addresses the needs of both residential and non-residential market segments, in retrofit and new construction. By virtue of its location on the Internet, it allows all persons interested to participate with the advantages the program provides. With proper marketing, we anticipate this to be one of the strongest tools available to small commercial customers, who have traditionally had limited access to this information.

The rationale for implementing this program specifically to the Northern California marketplace has to do with pre-existing status and first-phase implementation program introduction. The Lighting Exchange will promote the programs, program participants, and energy-savings goals specific to the Northern California region (including IOU and non-IOU programs), which represents a significant portion of the lighting marketplace within the state. In addition, there are several issues of ownership and marketability (such as the name "Lighting Exchange") that need to be resolved due to the pre-existence of the program that was funded through PG&E, and it is our hope that the CPUC will assist in providing the guidance and authority necessary to enable the Lighting Exchange to become autonomous from the IOU in a way that is helpful to all Northern California customers and the IOU itself.

We consider the Northern California marketplace to be a prime incubation place for the Lighting Exchange to break into the Internet world, and that business and residential customers in Northern California are highly likely to benefit from the program. Once the program has a one-year presence in the local Northern California market, we anticipate that the program can expand to other local markets.

Solutions to Market Barriers:

The Lighting Exchange provides rapid, inexpensive and brand neutral information on energy efficient technology, balancing information asymmetries between producers and implementers of technology, and resolving performance uncertainties with applications in practice. Specifically, the Lighting Exchange addresses the following (Note: these are taken from the CEC Lighting Efficiency Technology Report, Volume III, Market Barriers Report):

- The uses of energy-efficient technologies are sometimes not used due to concerns over Lamp/Ballast compatibility: *This issue will be addressed in the Guidance area, and the Lamp/Ballast Databases are specifically geared to provide rapid evaluation of this concern.*
- Consumers are not informed of differences of lamp types and do not understand how to buy them: *The Lamp Database will provide picture, size and specifications that allow for rapid identification. Also, the links through the manufacturers databases will allow consumers to find more specific information.*
- Residential customers, contractors, and retailers are not well-trained in lighting: *The lighting exchange will provide lighting information for all Northern California customers, and will have a residential focus for products that have been targeted by the state (CFL's, outdoor lighting, fluorescent lamps, etc.).*

- Residential contractors and customers have a bias against fluorescent lighting: *The Lighting Exchange will provide better information for residential customers on the proper selection of lamps, ballasts, and fixtures to improve the color and noise problems that have been experienced in the past. We envision cooperative efforts with the Flex Your Power, Energy Hotline, and other advertising and outreach programs to target the residential market sector.*
- Lighting professionals do not always choose the most energy-efficient technologies due to lack of time to research technologies: *The Lighting Exchange provides for design assistance and tools for the lighting professional, including access to the experts in all fields through the Dialog portion of the site. This forum approach enhances the ability of the design professional to gain knowledge through an expedient and reliable resource.*
- It has been acknowledged that the key to energy efficiency is a sophisticated client – the market barrier is reaching customers to advance their knowledge in energy-efficient products: *The Lighting Exchange, through the various mechanisms within the program, provides both push- and pull-drivers to rapidly expand the information resource throughout Northern California, and driving customers and lighting professionals alike toward investigating and using high-efficiency products.*

In summary, the Lighting Exchange integrates web-based tools for design and specification processes, advanced information access, and a live user-directed support center. It provides an electronic destination for professionals and consumers alike to ask questions and get focused quick answers, obtain reviews of the latest energy-efficient technologies, and perform technical and economic analyses to help users make decisions. It is expected that with the information and tools provided online in the Lighting Exchange, building professionals and Northern California consumers would be more likely to specify and implement energy–efficient lighting technologies.

Program Process

Program Enrollment:

This is an Information Program that provides a wealth of information to all Northern California customers. As such, there are no defined enrollment procedures, however, we will endeavor to trace the usage of the program to the extent possible through the programming of the website and customer-input criteria.

Specifically, anyone who requests information through the Dialog system will be required to provide their name and contact information prior to using the system, and this information will be retained on the system through the records by virtue of correlations with the users email address. For other use, there will be a one-time pop-up window asking for the zip code for the user, which will then apply a “cookie” to the computer, so that the user will be tracked for use by their zip code location.

Additional enrollment aspects may be added to the program, as the interfaces to the other local incentive programs are determined. These requirements are unknown at this time.

Marketing and Outreach Plan:

The Lighting Exchange will utilize existing energy-efficiency marketing programs, such as the "Flex Your Power", "Energy Hotline", and other marketing space on the local IOU mailers to the maximum extent possible. Direct mail, electronic adds, and print ads will also be used. Specific marketing proposals include:

- Product "kick-off" demonstrations at major trade events, such as Lightfair and local trade groups meetings such as the IES, AIA, BOMA, and City Governments.
- Email site announcements to major customers within the Northern California area, using databases provided by targeted organizations.
- Attach the Lighting Exchange as links from other energy-efficiency and lighting web sites, and place banner adds within other associated industry websites.
- Produce print publications for handing out at trade presentations and mailing to targeted customers.
- Utilize State sponsored sites and information dissemination programs, such as the "Flex Your Power" advertising campaigns through internet, radio, and print ads.
- Run print advertising in major architectural and lighting design publications

Targeted organizations include those representing the professional lighting community, consisting primarily of the following parties:

- Lighting Designers
- Architects and Interior Designers
- Electrical Engineers and Contractors
- Utility Representatives
- Lighting Equipment Manufacturers
- Manufacturers Representing Agencies
- Governmental Agencies
- Facility Managers
- Lighting Maintenance Contractors
- Lighting Retailers

Customer Eligibility

The Lighting Exchange will be directed and marketed to Northern California customers during the first year of operation and will contain links to Northern California energy user resources (i.e. incentive programs unique to Northern California). Content on the Lighting Exchange (particularly in the Dialog) will focus on issues, applications and lighting practice germane to Northern California. A local zip code from the user, for instance, will be required in order to expend staff effort on questions that require research.

On the other hand, it is not the intent of the program to disenfranchise users outside Northern California. The participation of people outside the local area will add to the discussions and overall product quality, and will not diminishing its' effectiveness in the local market.

Cost Effectiveness

The CPUC Energy Efficiency Policy Manual, page 28, states that information-only programs are not reasonably expected to provide an estimate of energy savings. The Lighting Exchange will provide energy savings over the long run by reducing barriers to adoption of energy efficient lighting technology (see discussion 'Solutions to Market Barriers' above).

We predict the following financial benefits to the State of California, however unscientific:

- Higher overall use of energy-efficient lighting products due to more available and reliable information
- Higher use of fluorescent lighting in residential applications due to marketing specific to this market
- Lower design, energy, and maintenance costs for building owners, due to the economic analysis tools and availability of advanced product information
- Increased level of activity in lighting retrofit construction due to the economic advantages and paybacks which are simplified in the program

Performance Goals

As an information only program, the program performance cannot be measured through economic payback or true energy analysis. The goals are therefore established for the first year of program implementation based on penetration (by quantitative use metrics) into the targeted organizations by virtue of their use of the site. These goals include:

- 40% of the membership within the targeted organizations will have viewed the site
- 15% of the membership within the targeted organizations will have registered as a User, which results in them having given more information to the site via voluntary registration and/or their participation in the Dialog portion of the site.

In addition, we anticipate approximately 30% of those persons visiting the "Flex Your Power" and other industry sites will visit and use the Lighting Exchange.

Evaluation, Measurement and Verification Plans

The electronic nature of the Lighting Exchange will provide ample quantitative data for evaluation. Site traffic will be analyzed and determination made of the percent of the local market being served. A follow-up survey will attempt to determine the extent to which the Lighting Exchange influenced design, specific or other professional practice decisions.

Participants will be characterized as "Viewers" or "Users". Viewers will be required to enter a zip code entry only one time, at which point a computer "cookie" is attached so that Viewer has a unique identity and activity can be traced numerically. Users will provide more information, including their email address, and we will monitor their participation through the Dialog portion of the site and through requests for feedback.

The success of the program will therefore be evaluated quantitatively through volume of use, and quantitatively through feedback from Users.

Implementer's Qualifications

This team unites domain expertise, application design, graphics, online learning design, extensive energy efficiency project management and technical support experience. We are intimately familiar with energy efficiency programs and specifically with PG&E service territory programs. We have had extensive relationships with PG&E's CEM department, the Pacific Energy Center (PEC), and have also served as lighting technical support and program design consultants for PG&E's Retrofit Express (Express Efficiency) for many years.

AfterImage + Space

AfterImage + Space is a multi-disciplinary architectural and lighting design firm that has provided consultation services in architectural design, lighting design, lighting education, lighting demonstration centers, lighting research, energy efficient lighting product development, internet site development, and graphics design. The formation of the company began in October of 1993 as *Design* +, with Brian Liebel as principal. Rita Lee and Brian formed a partnership in 1999, changing the name to reflect the added emphasis in architectural and lighting design. Marc Fountain has worked with the company since its inception, as an employee, consultant, project manager, and collaborating partner.

Marc Fountain, Ph.D.

Marc served as PG&E's project manager for the Lighting Exchange during his three-year tenure at the PEC, handling the strategic, contractual, financial, reporting, legal, vendor, and IT relationships internal and external to the IOU. Marc will be responsible for the selection of the computer programming team, oversee the technical aspects of the equipment selection, computer programming, and site administration, and oversee the operations side of the Lighting Exchange once it is online.

Rita Lee, AIA

Rita served in the first focus group for the lighting exchange and was at the head of the list for beta-testing before the project was abandoned. As a practicing architect with extensive experience visual design and energy efficient lighting, Rita will provide graphic interface design and oversee the graphic presentations for both computer interface and print publications. She will also be involved with testing program usability and provide first-level impact analysis of various test versions for education pathways.

Brian Liebel, PE, LC

Brian served as the Lighting Exchange's domain expert, managing all content, creating the information architecture, and designing the user experience specifically to meet the requirements of lighting professionals. His role in this endeavor will be to update the program functional requirements and specifications, direct the user interface and information flow requirements of the computer programming team, and administer the technical aspect of the Lighting Exchange once it is in operation.

(Professional Resumes are in Attachment 1)

Implementation Plan

Program Tasks:

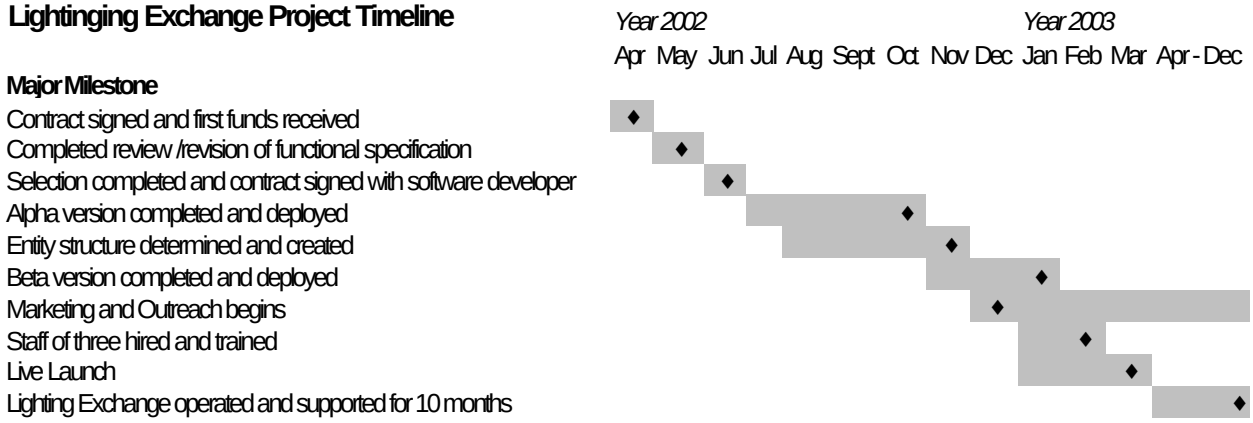
- Task 1: Review of existing functional specification and other available content
    - Review, update and/or re-create a new Functional Specification for use by the software development firm
- Task 2: Code Programming and Data Input of Lighting Exchange – Dialog and Tools
    - Select and subcontract with an internet software development firm
    - Purchase and deploy a web server
    - Solicit data from manufacturers for input into the databases
    - Provide copy (text) for all pages on the site
    - Program software and debug, using data provided by manufacturers
- Task 3: Scope Study - Guidance Section
    - Review ALG and original Lighting Exchange for content and applicability
    - Determine scope and level of effort required to execute the Guidance section of the Lighting Exchange
- Task 4: Interface and Graphic Design
    - Provide graphic design layouts, logos, and screen decks for the site
    - Determine interface structure (buttons, fill-ins, icons, etc)
- Task 5: Determine Structure of Lighting Exchange entity and hire staff
    - Develop a Business plan and entity structure for long-term operation of the Lighting Exchange, including a staffing plan and detailed operating budget.
    - Prepare staff operational criteria, including criteria for answering dialog questions
    - Develop list of research assistants and associates based on technical expertise in specific lighting related areas
    - Determine physical location of the Lighting Exchange for personnel and equipment.
- Task 6: Launch of the Lighting Exchange Internet Program – Dialog and Tools
    - Select Beta group for testing program and soliciting direct input for finalizing program completion
    - Send program to manufacturers whose data is in the program for cross-checking and feedback
    - Make final adjustments to program and launch
- Task 7: Operate and support the Lighting Exchange through 12/31/2003
    - Support a staff of 3 FTE's to maintain the content and manage the Dialog
    - Fund honoraria for lighting experts participating in the Dialog
    - Fund server co-location and maintenance
    - Prepare a plan and proposals for post-2003

Timeline:

Major Milestones

Contract signed and funds received	April 15, 2002
Completed review/revision of functional specification	May, 2002
Selection completed and contract signed with software developer	June 15, 2002
Alpha version completed and deployed	October 15, 2002
Entity structure determined and created	January 1, 2003
Beta version completed and deployed	January 1, 2003
Marketing and Outreach begins	January 1, 2003
Live Launch	March 1, 2003
Staff of 3 hired and trained	February 1, 2003
Lighting Exchange operated and supported for 10 months	December 31, 2003

Lightinging Exchange Project Timeline



Budget:

Item	First Year Cost	Second Year Cost	Total Cost
Administrative Costs			
Labor	101,634	112,164	213,798
Benefits	31,272	34,512	65,784
Overhead	3,454	25,884	49,338
Travel costs	1,208	1,208	2,415
Reporting costs	4,000	4,000	8,000
Materials & Handling	0	0	0
General and Administrative costs	30,000	30,000	60,000
Subcontractor costs (include same line items)	0	0	0
IOU Administrative Fee (only for non-IOU programs)	61,515	30,125	91,641
Marketing/Advertising/Outreach Costs			
1 brochure 25,000 copies	25,000	25,000	50,000
20 Electronic ads (design and placement)	20,000	20,000	40,000
5 Print Ad's (design and placement)	75,000	75,000	150,000
Postage for Print Ad's (25,000)	12,500	12,500	25,000
Direct Implementation Costs			
Technical	64,800	0	64,800
Project management	64,800	0	64,800
Software development	510,000	0	510,000
Hardware	53,000	15,000	68,000
Deployment	25,000	0	25,000
Usability testing	15,000	0	15,000
Graphic design	48,600	0	48,600
Edit content	56,160	56,160	112,320
Data entry	38,880	38,880	77,760
Honoraria to experts	0	25,000	25,000
Dialog manager		97,200	97,200
Server co-location	30,000	30,000	60,000
Technical	64,800	0	64,800
Project management	64,800	0	64,800
Evaluation, Measurement and Verification Costs			
Itemized, including subcontractor costs			
Other Costs			
TOTAL BUDGET	**$ 1,291,823**	**$ 632,633**	**$ 1,924,456**

Appendix 1

Professional Resumes

Marc E. Fountain, Ph.D.

1301 Quarry Court #311
Point Richmond, CA 94801
email: fountain@dnai.com

EXPERIENCE

Director of Internet Production — **Feb. 2000-Nov. 2001**
mywayhealth, inc. — Oakland, CA
Producer of internet site for a startup health plan. Develop detailed functional and design specifications, schedules and budgets for internet site. Manage contract resources and internal development team to implement front-end and integrate with back-end business systems.

Consultant — **Oct. 1999 – Feb. 2000**
The Digital Foundry — Tiburon, CA
In-house producer of internet site projects for start-ups and established 'clicks-and-mortar' retail clients: including account management, discovery, business process modeling, user interface design, information architecture, functional and technical requirements, project management and deployment.

Co-Founder — **May 1999 – Sep. 1999**
Cymetrics, LLC — San Francisco, CA
Technical operations, business process design and internet channel for service company providing property management and electronic commerce to the commercial building industry.

Information Systems Coordinator — **Apr. 1996 – May 1999**
Pacific Gas and Electric Company – Pacific Energy Center — San Francisco, CA
Planning, systems integration, website design/implementation, content quality and flow, and hardware/software specification. Successful internet marketing of energy-efficiency technology. Resolution of strategic, design, legal, financial and functional issues for multiple projects within a large California utility.

Principal — **1988 - 1996**
Environmental Analytics — Berkeley, CA
Performance monitoring of buildings, fundamental research, software design, data acquisition, survey research, instrumentation, electronics, statistical analysis, technical writing for over 20 consulting and research projects.

Project Designer — **1994-2002**
AfterImage + Space — Emeryville, CA
Performance specifications, creation of bid documents, computing resources, drawing flow and project management for architectural and lighting design firm. Full-time employment from 1994-1996, after which part-time work in energy-efficiency and lighting research work has been performed on an on-going basis.

EDUCATION

University of California, Berkeley — **1982 - 1993**
Berkeley, CA
Doctor of Philosophy in Architecture (minors in statistics and psychological scaling)
Bachelor of Arts in Geophysics
Bachelor of Arts in Physics

PUBLICATIONS

21 peer-reviewed papers and 13 project reports in the field of architectural science — **1987-1996**

HONORS/ AWARDS

Nevins award for significant contributions to the field of bioenvironmental engineering before the age of 30. — **1995**

Rita Lee, AIA

5950 Doyle Street #4
Emeryville, CA 94608
email: rita@aispace.com

EXPERIENCE

Principal — **Jan. 1999-Present**

AfterImage + s p a c e — Emeryville, CA

Principal in charge of interior architecture and architectural planning projects, custom millwork and exhibit design, graphics design projects, and project administration, with assistance in lighting design and research projects and office administration. Architectural projects include Law offices for Morrison and Foerster, LLP, American Light Showrooms in Dallas and Houston, and Laner Electric Showroom in Emeryville, CA. Graphics projects include identity branding and logos for the FSG group and AfterImage + Space.

Associate / Sr. Architect — **1996 – 1999**

MBT Architecture — San Francisco, CA

Project architect on several architecture and interior design projects, including: high-end corporate office interiors, conference centers, science/technology research facilities, medical research institute, and university campus planning projects. Responsibilities encompassed all phases of architecture from programming to completion of construction administration, with special emphasis on conceptual interior architectural design and development, materials and color selection, lighting design concepts and custom millwork designs.

Designer / Job Captain — **1994 – 1996**

GAP, Inc. — San Bruno, CA

Gap/GapKids/BabyGap: Designed and developed new store designs throughout the US and Canada. Designed prototype for first BabyGap store. Job Captain: Gap/GapKids (Tennessee, Ohio, Indiana): Responsible for development of entire project which include: all phases of architecture, specifications, consultant coordination and scheduling.

Architectural Designer — **1990 – 1994**

ED2 International — San Francisco, CA

Architectural designer on several research laboratory facilities encompassing technically complex buildings and specialized components of the laboratory campus. Responsibilities include; development of project from design development to completion of construction documents and construction administration, interior design, colors and materials selection, and studies for University campus programming and formulations.

EDUCATION

Pratt Institute, Bachelor of Architecture with Honors, New York

Pratt Studios, Architectural Studies Abroad, Rome, Italy

City College of San Francisco, Continuing Ed. design studios, San Francisco

Boston Architectural Center, Summer Architectural Design Program, Boston

PROFESSIONAL REGISTRATION/ AFFILIATIONS

Licensed Architect, State of California, License No. C26568 — **1995 - Present**

American Institute of Architects, San Francisco Chapter

Brian Liebel, PE, LC

5950 Doyle Street #4
Emeryville, CA 94608
email: brian@aispace.com

EXPERIENCE

Principal — **Oct. 1993 - Present**
AfterImage + s p a c e — Emeryville, CA

Principal in charge of lighting design, electrical engineering, and energy-efficiency projects. Provides operational and technical guidance for exhibit designs and interfaces with in-house architectural team in coordinating lighting and controls with building and exhibit construction design. Manages lighting and electrical projects and is client contact in developing project scope, defining project budgets, and establishing project schedules. Currently is helping to develop standards for lighting energy efficiency with DOE and PG&E using new light and vision research. Major projects include American Light showrooms, Osram Sylvania's LIGHTPOINT, CNET Offices, and the PG&E Energy Center.

Designer, Engineer — **Jun. 1984 – Sep. 1993**
The Engineering Enterprise — Alameda, CA

Work included lighting design, electrical engineering, preparing complete construction documents for lighting and electrical work, construction administration, and focusing and commissioning of lighting and controls systems. Was also responsible for managing project budgets, in-house design teams and up to 10 projects simultaneously.

Lighting Program Coordinator — **Jun. 1990 – Jan. 1993**
Pacific Energy Center — San Francisco, CA

While on a leave of absence from The Engineering Enterprise, was responsible for completing lighting and controls design and lighting exhibit design for the opening of the PG&E Energy Center. Managed lighting educational programs and new exhibits design. Established the PG&E Energy Center as a national leader in lighting education and resource for technical education.

EDUCATION

The University Of Kansas, Lawrence, Kansas — **1980 - 1984**
Bachelor of Architectural Engineering, Illumination Engineering Emphasis
Bachelor of Environmental Design with honors
Besal Scholarship

AWARDS

IIDA Special Citation Award — **1995**
IIDA Award of Merit — **1993, 1995**

PROFESSIONAL REGISTRATION/ AFFILIATIONS

Registered California Professional Engineer, License No.E13438 — **1988**
Lighting Certified, LC — **1999**

[mf1] Programs under this proposal run for only two years 1/1/02 to 12/31/03